

SALINITY AND CULTIVAR EFFECTS ON ALFALFA FORAGE YIELD AND NUTRITIVE VALUE IN A MEDITERRANEAN CLIMATE

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ABSTRACT

Salinity reduces crop yield, and the effects of salinity may be further exacerbated by drought and climate change. Some have suggested that alfalfa (*Medicago sativa* L.) is moderately salt sensitive, but field testing of improved cultivars is limited. We sought to determine the effects of high salinity (HS) irrigation water (EC_w 8.0-11.0 dS m⁻¹) on the yield and quality of 33 non-dormant alfalfa cultivars grown under drip irrigation in a Mediterranean environment over four years (2017-2020) in the San Joaquin valley of California. Salinity treatment and cultivar both had significant effects on yield and quality in alfalfa. The average yield loss due to HS irrigation was 23.9% over 3 full production years compared with lower salinity (LS) irrigation water (EC_w 0.5-1.2 dS m⁻¹), but total forage biomass levels under high salinity averaged 23.4 Mg ha⁻¹ over the 3 years, greater than average production in this region. Individual cultivars lost 10-30% of their LS yield when grown under HS conditions, but total biomass yields varied substantially. Forage quality was significantly improved under HS conditions and improvements were negatively correlated with yield ($R^2 > 0.81$), similar to responses in drought-stressed alfalfa. These yield results confirm greenhouse and sand tank studies indicating that alfalfa is generally highly salt tolerant, with potential for further improvement with salt tolerant cultivars. Such cultivars are needed, given a future of limited water supplies worldwide. Choices of cultivar for “salinity tolerance” should be determined by both the total biomass yields under both high and low saline conditions as well as the Salinity Tolerance Index (STI).

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